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The Mineral Industry of China

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The Mineral Industry of China

By E. Chin[1]

China is a major world producer of metals, industrial minerals, and fuels. It is the second largest world producer of coal and the seventh largest producer of crude oil. For industrial minerals, China ranks within the top five world producers for barite, cement, fluorspar, magnesite, marble, and talc. China produces large quantities of iron ore and manganese, although of low grade. It is the sixth largest steel producer in the world and the third largest vanadium producer. There is significant mine output of antimony and tungsten, which is historically associated with China, as well as tin. China is perhaps the sixth largest gold producer in the world. In addition, it is expanding its production capacity of aluminum, copper, lead and zinc, and nickel.

China has a large mineral reserve base, and the latent potential to increase production substantially is an undisputed reality. However, because of its huge population, a billion-plus people, per capita consumption of minerals, metals, and fuels is quite small compared with that of developed countries. The Government plans to quadruple the value of industrial output by the year 2000. Notwithstanding large increases in production capabilities, the growth of China's per capita consumption of its mineral wealth will be moderated by its export drive to garner foreign exchange necessary for modernization and growth.

In 1979, the Government initiated reforms to moderate the emphasis on developing heavy industry by increasing investments in the agricultural and light industrial sectors. By 1984, the economic readjustment program included far-reaching reforms such as dismantling the commune system, substitution of taxes for profit remittances to the state, replacing budget allocations with bank loans, reintroduction and participation of private enterprise in the economy, reintroduction of a free market system, and a reform of industrial management. Other measures to stimulate the economy included investment of $45 billion for new technology during 1981-84, and inviting wider economic and technical exchanges with foreign countries and companies. In addition, the shift in output by defense industries produced civilian goods valued at $2 billion[2] in 1984. During 1979-81, China's industry grew at an average rate of 7.1% compared with 10.6% for 1982-84. Industrial output grew by 13.6%, reaching $350 billion in 1984. According to China's State Statistical Bureau, light industry registered a 13.4% increase over that of 1983 compared with 13.8% for heavy industry, which was considered a balanced growth.[3]

Production of coal was 772 million tons; crude oil, 115 million tons; and steel, 43 million tons. In addition, the country's railways handled 1.2 billion tons of freight and 1.1 billion passengers, representing an increase of 4.4% and 6.9%, respectively. Output of 48 of the 100 major industrial products surveyed by the State Statistical Bureau had reached the target level set for 1985, the last year of China's sixth 5-year plan (1981-85). By region, industrial production maintained momentum in Fujian, Guangdong, Jiangsu, Zhejiang, and other coastal Provinces where output increased between 19% and 24%. In traditionally less developed areas such as Guizhou, Ningxia, Qinghai, and Yunnan, production increases ranged from 13% to 17%.

The Chinese press considered the following achievements significant in 1984 toward China's modernization program: launching

an experimental communications satellite; opening of 14 coastal cities (excluding the 4 previously established special economic zones) and Hainan Dao to foreign investment; participation in the 23d Olympiad; signing of the Sino-British joint declaration regarding the status of Hong Kong; and the decision by the Central Committee to adopt formally reforms to China's economic structure. Other heralded achievements included (1) the new level of output for grain and cotton; crude oil, coal, and electricity; and select consumer products, (2) the increase in domestic retail sales, and (3) the high level of individual savings.

In June 1983, China replaced its profit-appropriation system with the first phase of its new taxation system. In this phase, enterprises paid both taxes and a portion of the profits to the state. The second phase went into effect in October 1984 whereby the enterprises paid only taxes to the state. Any remaining profits left after taxation were to be used by the enterprise. Taxes levied by the state included a product tax—an economic lever to prevent enterprises from producing only high-profit items; taxes on products that yield small profits or losses are reduced or exempt. A value-added tax system was imposed because of the imbalance in tax burden throughout the stages of production—from the initial processing of raw materials, through the manufacture of components, to assembly of finished products. A tax rate system was to be imposed on domestic commodity sales. For small enterprises, an income tax was levied, and for high-profit enterprises, a regulation tax was to be levied. The tax on salt was to regulate uniformly the price between user and producer throughout the country because of the disparity of salt reserves and quality in various localities. In the mining sector, a resource tax was imposed to adjust the wide profit rate for mine products and the difference in mineral resources available.[4]

Another reform initiated was in the wage system whereby an enterprise imposed no wage ceiling and minimum. The existing wage system, based on grade, was to give way to remuneration based on performance. For instance, to raise efficiency and productivity at the Xinqui surface coal mine in Liaoning, wages were based on each ton of coal produced, with penalties imposed when coal quality and safety standards were not met.

In early 1984, the State Council decided to open 14 port cities and Hainan Dao to foreign investors. As with the four special economic zones, foreign investors will receive preferential tax treatment, simplified entry-exit procedures, and rights to establish wholly owned enterprises. Furthermore, foreign management of joint ventures is subject to renewal through negotiation. Approval for construction projects using foreign investment and technology was to be decentralized. To accelerate and expand economic cooperation and technology exchange, the State Council issued temporary provisions on tax reduction and exemption in the special economic zones and for the 14 port cities.[5] In addition, the Government was to promulgate a law on protecting the rights of enterprises wholly owned by foreign investors. The first wholly owned foreign company in China was 3M China Ltd., a subsidiary of a U.S. company.

China enacted its own patent law, detailing rules and regulations to protect patent rights. In addition, the Government applied in late 1984 for membership to the Paris Convention for the protection of industrial property. In the interim, the terms for patent protection were to be stipulated in a technology transfer agreement or in the license agreement as well as stipulate compensation for violation or infringement of the patent right.

In addition to Hainan Dao (Guangdong), the 14 coastal cities opened to foreign investment were, from north to south, Dalian, Qinhuangdao, Tianjin, Yantai, Qingdao, Lianyungang, Nantong, Shanghai, Ningbo, Wenzhou, Fuzhou, Guangzhou, Zhanjiang, and Beihai. Special foreign investment policies will be applied to the 14 cities and Hainan Dao, as well as to the special economic zones. In addition, the autonomous power for decision making of these places would be expanded. Although the population of the 14 cities collectively constitute close to 8% of the nation's total, the gross value of its industrial production ($713 million) accounted for almost 25% of the country's aggregate output. For instance, industrial production in Shanghai is estimated at approximately $320 million annually, followed by Tianjin, $115 million, and Guangzhou, $60 million. In addition, the 14 coastal cities account for 97% of the nation's total volume of freight carried by land and sea.[6]

Dalian, Liaoning, the second largest port in China, has 7 operational areas with 48 berths, 23 of which have a 10,000-ton handling capacity. Dalian has a comprehen-

sive industrial foundation that includes machinery, metallurgy, petrochemicals, shipbuilding, and textiles. Dalian Chemical Industrial Co. produces over 40% of the country's sodium carbonate, while the Dalian steel mill accounts for about one-third of the national output of high-speed tool steel and wire. In China, Dalian is referred to as the "bay of blue" and also as the "pearl of the Yellow Sea."

The Great Wall winds along the shore of Bo Hai to the mountain top at Yansai Lake in Qinhuangdao, Hebei. The industries here include construction materials, machinery, and metallurgy. However, Qinhuangdao is best known for glass production, in addition to tourism. The old Yaohua glass factory produces about 3.4 million standard cases of plate glass. Output of this enterprise is supplemented by 15 factories. Qinhuangdao Municipal Glass Factory, the newest producer, which began production in 1983, has an annual production capacity of 940,000 standard cases of plate glass and glass fibers. Qinhuangdao accounts for 70% of China's glass exports. Qinhuangdao is serviced by the Beijing-Shenyang Railway, Beijing-Shenyang Highway, Beijing-Qinhuangdao electrified railway, and Datong-Qinhuangdao Railway (under construction). The railways play an important part in the export of coal produced in Shaanxi and Nei Monggol, as well as for crude oil from Daqing, and shipment of local output of salt.

Tianjin, capable of handling 15 million tons of cargo per year, is the largest trading port in north China (Hebei) with 34 berths, 20 of which are capable of accommodating ships over 10,000 tons. Tianjin is serviced by an airport, one of the largest in the nation, and the Beijing-Shenyang and Beijing-Shanghai Railways' trunk lines. Nearby, the Dagang Oilfield produces petroleum and natural gas for domestic consumption and a lesser amount for export. Salt production along Bo Hai accounts for about 25% of the national output. "Changlu" salt is well known domestically and in export markets.

Yantai is at the eastern end of Shandong, facing Dalian. Yantai is linked by rail with Beijing, Jinan, and Qingdao. Yantai has 15 berths capable of handling 5 million tons of freight per year. Qingdao, ranking sixth in national export freight, has 9 wharves with 49 berths, 15 of which are capable of accommodating vessels exceeding 10,000 tons. Airline connections extend to Shanghai, Beijing, and Dalian, and the airport was to be converted into an international airport. A new port was scheduled to be built at Huangdao; a railway was to be constructed between Huangdao and Jiaoxian; a ferry boat service was to be started between Qingdao and Huangdao; and a rail service was to be reestablished between Jiaozhou and Jinan.

Lianyungang is the starting point of the Longhai Railway linking northern Jiansu, southern Shandong, northern Anhui, Henan, Shanxi, and Shaanxi as well as points in Sichuan, Gansu, Qinghai, Xinjiang, and Ningxia. There are highway connections to Nantong, Nanjing, Xuzhou, and Qingdao. Lianyungang has five 10,000-ton, two 5,000-ton, and two 3,000-ton class berths. Construction west of the present harbor area to be completed in 1985 will quadruple coal handling capacity. Lianyungang is known for "Huai" salt, produced by the Huaibei saltworks (one of the four sea evaporite producing operations in the country), and Jingping phosphate, produced at one of six large phosphate mines in the nation, on the southern slope of the Jingping Mountain Range.

Nantong, Jiangsu, is on the northern shore of the lower reaches of the Chang Jiang, and is capable of berthing 30,000- to 50,000-ton seagoing vessels. The canals from Nantong extend to Ganyu, Yangzhou, and northern Jiangsu. Upriver, Nantong services the economically important areas of Jiangsu, Anhui, Jiangxi, Hubei, Hunan, and Sichuan.

Shanghai, referred to as the "thoroughfare to the eight provinces," is the gateway from the Chang Jiang to the East China Sea. Shanghai is heavily industrialized with cottage businesses to petrochemicals. The Baoshan iron and steel complex, scheduled for completion in 1985, is nearby. Economic development and trade zones are being constructed at Minxing and Hongqaio. As China's largest trade port, Shanghai Hongqiao handles close to 92 million tons of cargo annually in its berths.

Ningbo, Zhejiang, about 110 nautical miles south of Shanghai, has three harbor areas—Beilun, Ningbo, and Zhenhai. Altogether, the harbors have an annual freight volume of 27 million tons. The newly established Beilun Harbor area and the second-phase construction of the Baogang facility at Shanghai form China's largest transshipment wharfage for mineral ores. Industries in Ningbo include electronics, machinery, petrochemicals, and textiles.

Wenzhou, Zhejiang, has wharves accessi-

ble to 7,000-ton vessels at high tide, and 40 more were being planned for berthing 10,000-ton ships. Wenzhou is referred to as "the alumstone capital." The reserves of alunite along the banks of the Ou Jiang at Wenzhou are estimated at 300 million tons. Farther south is Fuzhou, the capital city of Fujian. Fuzhou's industry includes chemicals, electronics, machinery, papermaking, and textiles. Fuzhou's port at Nawei is accessible to 10,000-ton vessels at high tide.

Guangzhou, Guangdong, is on the northern edge of the Zhu Jiang Delta, facing the South China Sea. Three rail lines feed into Guangzhou—the Beijing-Guangzhou Railway, Guangzhou-Shenzhen Railway, and Guangzhou-Sansui Railway. Both the inner Port of Guangzhou and the outer Port of Huangpu are open to ocean traffic. For many years, Guangzhou served as the outlet of Chinese goods by hosting the Canton trade fairs. Zhanjiang, southwest of Guangzhou and also in Guangdong, is a deepwater harbor and is China's base for offshore oil exploration in the South China Sea. In 1984, six deepwater berths to accommodate vessels exceeding 10,000 tons were under construction.

The Beihai Port serves as an outlet for the export of goods from Guangxi, Yunnan, Guizhou, and Sichuan. Beihai is known for its clays, coal, pearls, potter's clay, and quartz. Because of its geographical position, Beihai serves as a base for oil drilling in Beibu Wan.

Hainan, with a coastline measuring about 1,400 kilometers, is largely underdeveloped except for fishery. The other traditional industry in Hainan is agricultural, featuring tropical plants and fruits. Because of its lush vegetation and rare birds and animals, Hainan was to develop infrastructure for tourism. Aside from the iron ore deposit at Shiliu, minerals of cobalt, manganese, quartz, and titanium in Hainan are largely underdeveloped.[7]

By opening the 4 economic zones (Shantou, Shenzhen, Xiamen, and Zhuhai), the 14 coastal cities, and Hainan Dao to foreign investment, China expected to accelerate the development of its economy and society. By expanding foreign trade, domestic production would increase and provide foreign exchange. The use of foreign investment capital would free domestic funds, the introduction of which could be allocated for other uses. China's open-door policy would encourage advanced technology from foreign countries. Industry personnel would benefit in learning managerial skills. Exchange and cooperation would immediately infuse up-to-date scientific and technological knowledge.[8]

As part of the Government reorganization plan, the Ministry of Foreign Economic Relations and Trade would divorce itself from decision making in the producing sector. The functions of the Ministry would include formulating guidelines, policies, and regulations; issuing trade licenses; and establishing quality specifications for trade items.[9]

During the course of the sixth 5-year plan (1981-85), 890 projects were to be completed, 169 of which were considered key projects by the State Planning Commission. Although construction on all projects was to begin during 1981-85, some projects were to be completed in the next 5-year plan. Sixty of the key projects are energy development projects, whose completion will raise the country's coal production capacity by 84.3 million tons, crude oil extraction capacity by 31.3 million tons, and power generation capacity by 24.3 million kilowatts. Thirty-nine projects were for railway electrification and double tracking, port construction, and communications, while 33 involved raw materials. Sixteen involved educational and medical projects; 8, national defense; and 13, automotive and light industry.

Developing transportation infrastructure is crucial in China's modernization program for movement of goods between the inland and the coast. In 1984, 15,000 kilometers of new highways were added making a total of 930,000 kilometers open to traffic. About 29,000 kilometers was rebuilt during the year, and a 1,700-kilometer stretch between Qinghai and Xizang was asphalted. Construction began on a 20-kilometer Jiading Expressway in Shanghai, the first in China, which is scheduled for completion in 1987. The International Bank for Reconstruction and Development agreed to provide $70 million for highway construction in Shaanxi and Shandong. Funds for the Guangzhou Expressway were being solicited.

Construction of 86 highway bridges was completed in 1984. These included the 1,116-meter Dalinghe Bridge in Liaoning, the longest; Oujiang Bridge in Zhejiang; Weihe River Bridge in Shaanxi; and the Shanhongqi Bridge in Guangdong. In addition, 112 highway bridges were under construction. The 5,560-meter Huang He Bridge, to be the longest in the country, was to be completed by 1987.[10]

During 1984, China added 355 kilometers of railway, double tracked 418 kilometers, and electrified 681 kilometers. China has a total of 52,000 kilometers of railway.[11] In 1984, passenger volume was 1.1 billion, and cargo transport, 1.2 billion tons. During the year, 652 locomotives (diesel, electric, and steam), 17,900 freight cars, and 1,180 passenger cars were built.

China has shipping agreements with 32 countries. Its 550-vessel ocean fleet includes roll-on and roll-off ships, container and general cargo ships, bulk carriers, passenger vessels, and oil tankers.[12] The fleet handles 37% of China's foreign trade volume and annually transports more than 10 million tons of cargo for developing countries. Also, the fleet transports additional cargo in accordance with foreign trade agreements. In 1984, cargo tonnage transported was about 42 million tons.

China promulgated and put into effect a series of laws and regulations for environmental protection. These included the Water Pollution Prevention and Control Law, Regulations for Strengthening Environmental Control of Rural Township and Street Enterprises, Prevention of Soot Pollution, and Trial Targets for Examining Environmental Protection in Industrial Enterprises. Draft legislation was prepared for noise and air pollution. During the year, 22 atmospheric observation stations were installed, bringing the total number to 1,143 nationwide. More than 150 projects to clean up obvious pollution were under way. Legislation was also drafted on managing nature preserves and on protecting rare and endangered animals and plants. China has 106 protected districts with a total area of about 3.9 million hectares, which accounts for about 0.4% of the nation's territory.[13]

A law was drafted on the use and protection of China's mineral resources. The law covers everything from prospecting, exploration, and geologic studies to management and conservation of the nation's resources. Chinese geologists have verified reserves of 136 minerals in China. According to the Ministry of Geology and Resources, geologic prospecting in 1984 was successful in that finds of coal, gas, and oil were larger than expected. Estimates of the coal finds would add 13.2 billion tons to the country's reserves of 727 billion tons. A deep well drilled in the northern part of the Tarim Basin (Xinjiang) yielded a flow of 6,000 barrels of oil and 2 million cubic meters of gas per day. Deposits of emeralds and sapphires were also discovered. Estimated finds for zinc during the year were 3.1 million tons; lead, 1.2 million tons; copper, 1.1 million tons; nickel, 92,300 tons; and silver, 5,600 tons.[14] During the past 5 years, the area covered in geologic exploration included 2.7 million square kilometers of aerial remote magnetic surveying, 430,000 square kilometers of aerial remote sensing, and 1.2 million square kilometers subjected to geochemical sampling. Proven reserves of antimony, asbestos, fluorspar, graphite, iron, lead, magnesite, mercury, molybdenum, phosphorus, sulfur, tin, titanium, tungsten, vanadium, and zinc in China rank first worldwide.[15]

The use of geologic remote sensing has grown rapidly in China. This technique is used by the Ministries of Coal Industry, Metallurgical Industry, Water Conservancy and Power, Geology and Minerals, Nuclear Industry, Petroleum Industry, and Railways; the State Seismological Bureau; the Chinese Academy of Sciences; and various universities and colleges. For instance, the Ministry of Nuclear Industry conducted computer processing of satellite data in Nei Monggol that resulted in the location of sedimentary uranium deposits. The Ministry of Metallurgical Industry studied the image characteristics of copper and iron deposits in the lower Chang Jiang; molybdenum deposits of Jinduicheng, Shaanxi; the tin deposits in Gejiu, Yunnan; and the copper deposits of Dexing, Jiangxi. The Ministry of Coal Industry used remote sensing for coal studies in Da Hinggan Ling, Nei Monggol, and Taiyüan, Shanxi; and for peat in Chao Hu, Anhui, and Roigi, Sichuan. The Ministry of Petroleum Industry with the U.S. Geological Survey used remote sensing to study gas-bearing structures in the Qaidim Basin, Qinghai. Thus, remote sensing has become an effective tool in China's geologic studies.[16]

In 1984, supervision and administration of China's nonferrous metals industry was separated from the Ministry of Metallurgical Industry and placed under the aegis of a company, the China National Nonferrous Metal Industry Corp. (CNNMIC). CNNMIC, which reports to the State Council, administers nonferrous metals prospecting, development and operation of mines, mineral processing plants, smelters, and metal processing facilities. In addition, its function extends to the import and export of nonferrous metal products. On December 11, 1984, the China Nonferrous Metal Society was

inaugurated. In this instance, nonferrous activity was removed from the umbrella of the Chinese Society of Metals.

China's economic growth in 1984 was close to 14%, and the value of industrial output was estimated at $350 billion. The Government attributed the growth to rural economic reforms, industrial restructuring, investments in new technology, increased activities in foreign economic and technical exchanges, and growing consumer demand in the domestic market.

PRODUCTION

China's mineral resources are large and multifarious, and mining can be expanded. However, China has only been recently active in the surveying, delineation, and cataloging of its mineral wealth. China is a major producer of mineral fuels, ranking second in the world for coal, and seventh for oil. It is among the world's top producing countries in the output of antimony, barite, cement, fluorspar, iron and steel, magnesite, phosphate, rare earths, salt, talc, tungsten, and vanadium. It is also a notable producer of fertilizers, gold, gypsum, ilmenite, manganese, peat, silver, and tin. In 1984, the national production of coal and oil reached new highs. Electricity generation increased 14% in 1984. Pig iron production was up 7%, and crude steel output increased 8%. Output of major nonferrous metals increased 8%, and gold production was up close to 11%, according to other sources.

The sixth 5-year plan (1981-85) reflects a realistic pace for China's modernization. The overall plan was to balance the development of heavy industry to support growth in light industry and agriculture. Increased trade was stressed to stimulate production. Other stimulants for growth included giving bonuses for increased productivity and giving recognition and monetary awards for quality products. Increased efficiency in manufacturing was to be accomplished through integration. Short-term constraints to industry were the introduction of pollution standards and energy conservation. However, output of many major commodities in the penultimate year of the current economic plan exceeded the target set for 1985.

Table 1.—China: Estimated production of mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983	1984[p]
METALS					
Aluminum:					
Bauxite, gross weight	r1,500,000	r1,500,000	r1,600,000	1,600,000	1,600,000
Alumina, gross weight	750,000	750,000	r800,000	800,000	800,000
Metal, refined, primary	360,000	r380,000	380,000	380,000	380,000
Antimony, mine output, metal content	10,000	10,000	12,000	15,000	15,000
Bismuth, mine output, metal content	260	260	260	260	260
Cadmium, smelter	250	270	300	300	300
Copper:					
Mine output, metal content	r115,000	r170,000	r175,000	175,000	180,000
Metal:					
Smelter, primary and secondary	r175,000	r190,000	r205,000	195,000	210,000
Refined, primary and secondary	r295,000	r300,000	300,000	310,000	310,000
Gold, mine output, metal content ... troy ounces	225,000	1,700,000	r1,800,000	1,850,000	1,900,000
Iron and steel:					
Iron ore, gross weight[3] ... thousand tons	75,000	75,000	75,000	75,000	75,000
Pig iron ... do.	38,020	34,170	35,535	37,380	39,980
Ferroalloys ... do.	1,000	940	880	900	900
Steel, crude ... do.	37,120	35,600	37,160	40,020	43,370
Steel, rolled ... do.	27,160	26,700	29,008	30,720	33,710
Lead:					
Mine output, metal content	160,000	160,000	160,000	160,000	160,000
Metal, refined, primary and secondary	175,000	175,000	175,000	195,000	195,000
Magnesium metal, primary	7,000	7,000	7,000	7,000	7,000
Manganese ore, gross weight ... thousand tons	1,600	1,600	1,600	1,600	1,600
Mercury, mine output, metal content 76-pound flasks	20,000	20,000	20,000	20,000	20,000
Molybdenum, mine output, metal content	2,000	2,000	2,000	2,000	2,000
Nickel:					
Mine	11,000	11,000	12,000	13,000	15,000
Smelter	11,000	11,000	12,000	13,000	14,000

See footnotes at end of table.

Table 1.—China: Estimated production of mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity[2]	1980	1981	1982	1983	1984[p]
METALS —Continued					
Silver, mine output, metal content thousand troy ounces	r2,500	r2,500	r2,500	2,500	2,500
Tin:					
Mine output, metal content	r14,600	r15,000	r15,000	15,000	15,000
Metal, smelter	r15,000	r15,000	r15,000	15,000	15,000
Tungsten, mine output, metal content	15,000	13,500	12,500	12,500	13,500
Zinc:					
Mine output, metal content	r160,000	160,000	160,000	160,000	160,000
Refined, primary and secondary	160,000	r160,000	r160,000	175,000	185,000
NONMETALS					
Asbestos	131,700	106,000	110,000	160,000	160,000
Barite	680,000	r800,000	900,000	1,000,000	1,000,000
Cement, hydraulic thousand tons	79,860	84,000	94,072	108,250	121,080
Fluorspar	480,000	480,000	550,000	650,000	650,000
Graphite	160,000	184,000	185,000	185,000	185,000
Gypsum thousand tons	r3,300	r3,400	r3,500	4,300	4,800
Kyanite and related materials	2,500	2,500	2,500	2,500	2,500
Lithium minerals, all types	14,000	14,000	14,000	15,000	15,000
Magnesite thousand tons	2,000	2,000	2,000	2,000	2,000
Nitrogen: N content of ammonia do	9,990	12,193	12,711	13,766	14,000
Phosphate rock and apatite, P_2O_5 equivalent do	2,360	2,530	2,580	2,750	3,540
Potash, marketable, K_2O equivalent do	12	20	26	29	41
Salt do	17,280	18,320	16,384	16,130	16,000
Sodium compounds: Sodium carbonate, natural and synthetic do	1,613	1,652	1,734	1,793	1,880
Sulfur:					
Native	200,000	200,000	200,000	200,000	200,000
Content of pyrite	1,700,000	r1,800,000	r1,800,000	2,300,000	2,300,000
Byproduct, all sources	r300,000	r300,000	r300,000	350,000	350,000
Total	r2,200,000	2,300,000	2,300,000	2,850,000	2,850,000
Talc and related materials	915,000	r900,000	950,000	950,000	950,000
MINERAL FUELS AND RELATED MATERIALS					
Coal:					
Anthracite thousand tons	r124,000	r124,000	r130,000	143,000	154,000
Bituminous and lignite do	r496,000	r497,000	r521,000	572,000	618,000
Total do	620,000	621,000	651,000	715,000	772,000
Coke, all types do	34,050	31,720	33,245	34,510	35,000
Gas, natural:					
Gross billion cubic feet	555	495	455	480	490
Marketed do	504	450	414	431	438
Petroleum:					
Crude (including crude from oil shale) thousand 42-gallon barrels	773,435	738,906	744,994	774,311	836,069
Refinery products do	470,000	450,000	475,000	500,000	550,000

[p]Preliminary. [r]Revised.

[1]Table includes data available through Sept. 6, 1985.

[2]In addition to the commodities listed for which quantitative estimates of output have been made, China is known or believed to have produced other commodities for which no estimates have been prepared.

[3]In terms of 50% Fe ore.

TRADE

The value of China's trade in 1984 was $43.3 billion. Exports increased 33% to $20.9 billion, and imports, 47% to $22.4 billion. China's largest trading partners were Japan, accounting for 26% of China's total trade, followed by Hong Kong and Macao, 19%; the United States, 12%; member countries of the European Economic Community, 10%; member countries of the Association of South East Asian Nations, 6%; Canada and the U.S.S.R., 3% each; and Australia and Brazil, 2% each.

China's principal export classes were mineral fuels, valued at $4.8 billion; heavy industry products, $3.0 billion; industrial materials, $1.6 billion; and chemical products, $0.8 billion. In comparison, China imported heavy industrial products, valued at $11.5 billion; chemical products, $3.4 billion; and industrial materials, $2.1 bil-

lion.

By type of product, China's main export materials were coal, crude oil, and petroleum products. Imports were dominated by fertilizer, iron and steel, machinery and transport equipment, metalliferous ores, and nonferrous metals.

Table 2.—China: Apparent exports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Destinations, 1983	
			United States	Other (principal)
METALS				
Alkali and alkaline-earth metals	77	116	--	Hong Kong 48; West Germany 39; Netherlands 19.
Aluminum:				
Ore and concentrate	198,155	274,764	65,075	West Germany 55,494; Japan 37,030; France 27,350.
Oxides and hydroxides	115,081	13,946	--	Thailand 3,877; Indonesia 2,900; Hong Kong 2,234.
Metal including alloys:				
Scrap	146	147	--	All to Hong Kong.
Unwrought	48,836	14,358	--	Japan 10,579; Hong Kong 2,445.
Semimanufactures	4,983	8,674	211	Hong Kong 7,633; Indonesia 304.
Antimony:				
Ore and concentrate	1,386	2,106	--	Japan 1,356; West Germany 700.
Oxides	2,407	1,472	--	Japan 1,014; West Germany 406.
Metal including alloys, all forms	3,244	4,644	--	Japan 3,469; United Kingdom 439.
Arsenic:				
Ore and concentrate	--	5	--	All to Thailand.
Oxides and acids	2,155	135	--	Japan 67; Hong Kong 46; Philippines 17.
Beryllium: Oxides and hydroxides	50	30	--	All to Japan.
Cadmium: Metal including alloys, all forms	186	177	--	West Germany 137; Netherlands 40.
Chromium:				
Ore and concentrate	1,148	3,632	--	Ireland 3,273; France 359.
Oxides and hydroxides	1,503	1,390	241	West Germany 430; United Kingdom 293.
Metal including alloys, all forms	68	180	--	West Germany 163.
Cobalt:				
Oxides and hydroxides	36	84	--	Indonesia 60; West Germany 16.
Metal including alloys, all forms	6	--		
Columbium and tantalum: Ore and concentrate value, thousands	$1	--		
Copper:				
Oxides	24	3	--	All to Hong Kong.
Sulfate	279	306	--	Japan 220; Hong Kong 86.
Metal including alloys:				
Scrap	241	304	--	Hong Kong 257; Japan 47.
Unwrought	3,504	51	--	Hong Kong 27; Japan 22.
Semimanufactures	7,746	10,767	(2)	Hong Kong 10,070; Singapore 210.
Germanium: Metal including alloys, all forms	1	1	--	All to Japan.
Gold: Metal including alloys, unwrought and partly wrought troy ounces	273,966	2,636	--	All to Hong Kong.
Indium: Metal including alloys, all forms kilograms	--	305	--	All to Japan.
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite	--	85	--	All to West Germany.
Metal:				
Scrap	98,317	36,562	(2)	Hong Kong 14,072; Japan 13,391; Thailand 5,049.
Pig iron, cast iron, related materials	902,871	56,036	--	Japan 38,332; Indonesia 9,249; Hong Kong 7,797.
Ferroalloys:				
Ferromanganese	4,515	2,042	--	Pakistan 1,394; Philippines 324; Indonesia 202.
Ferrosilicon	37,513	4,729	--	Japan 2,933; Indonesia 960; Hong Kong 600.
Silicon metal	--	17,883	--	All to Japan.
Unspecified	34,031	3,413	--	Japan 2,660; Singapore 305.
Steel, primary forms	172,087	11,937	--	Singapore 10,006; Pakistan 1,669.
Semimanufactures	805,393	482,031	3,824	Hong Kong 404,645; Singapore 38,316.

See footnotes at end of table.

Table 2.—China: Apparent exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Destinations, 1983	
			United States	Other (principal)
METALS —Continued				
Lead:				
Ore and concentrate	54	407	--	All to Thailand.
Oxides	690	846	--	Japan 334; Pakistan 259; Indonesia 101.
Metal including alloys:				
Scrap	50	--		
Unwrought	2,241	3,078	--	Thailand 1,827; Hong Kong 723; Philippines 320.
Semimanufactures	127	247	--	Indonesia 231.
Lithium: Oxides and hydroxides	308	342	--	France 145; West Germany 63; United Kingdom 47.
Magnesium:				
Oxides	50	--		
Metal including alloys, all forms	443	559	47	West Germany 324; Japan 144.
Manganese:				
Ore and concentrate	20,325	22,713	--	Japan 20,643; West Germany 1,401.
Oxides	4,393	4,903	--	Hong Kong 2,491; Singapore 1,447; Indonesia 671.
Metal including alloys, all forms	93	856	--	West Germany 363; Canada 300; Netherlands 102.
Mercury 76-pound flasks	8,694	6,338	--	Hong Kong 2,573; Pakistan 1,363; Japan 1,071.
Molybdenum:				
Ore and concentrate	(*)	60	--	United Kingdom 40; Finland 10; Japan 10.
Oxides and hydroxides	6	6	--	All to Netherlands.
Metal including alloys, all forms	16	NA		
Nickel:				
Oxides	19	55	--	All to Hong Kong.
Metal including alloys, all forms	3	24	--	Pakistan 18; Thailand 4.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$3,170	$4,186	$2,390	West Germany $844; United Kingdom $385.
Rare-earth metals	100	126	120	Japan 6.
Silicon, elemental	13,333	120	--	Mainly to France.
Silver:				
Waste and sweepings[3] value, thousands	$285	$1,302	--	West Germany $894; United Kingdom $391.
Metal including alloys, unwrought and partly wrought do.	$1,158	$5,931	--	France $5,329; Hong Kong $600.
Tin:				
Ore and concentrate	10	--		
Metal including alloys:				
Scrap	434	1	--	All to Hong Kong.
Unwrought	4,263	2,846	1,938	Hong Kong 634; West Germany 186; Yugoslavia 65.
Semimanufactures	435	1,282	--	Japan 861; Hong Kong 389.
Titanium:				
Oxides	2,259	1,810	36	Hong Kong 820; Japan 606; France 143.
Slag	--	10	--	All to Japan.
Metal including alloys, all forms	108	--		
Tungsten:				
Ore and concentrate	2,762	3,836	229	West Germany 2,042; Japan 1,006; Sweden 293.
Oxides and hydroxides	13	15	--	All to Belgium-Luxembourg.
Metal including alloys, all forms	169	216	1	Japan 150; Singapore 62.
Uranium and/or thorium:				
Ore and concentrate	34	760	--	France 717; Japan 28.
Metal including alloys, all forms	44	10	--	All to Indonesia.
Vanadium: Oxides and hydroxides	2,928	3,860	--	Belgium-Luxembourg 2,488; Japan 768; West Germany 306.
Zinc:				
Oxides	5,168	2,824	159	Japan 631; West Germany 331; Algeria 300.
Metal including alloys, all forms	12,761	3,329	--	Japan 2,275; Hong Kong 768.
Other:				
Ores and concentrates	7,808	14,981	715	Italy 5,196; West Germany 4,404; Indonesia 2,000.
Oxides and hydroxides	9,481	1,691	565	West Germany 781.
Ashes and residues	14,778	7,974	--	All to Hong Kong.
Base metals including alloys, all forms:				
Quantity, reported	1,365	1,608	--	Japan 592; Hong Kong 344; Brazil 125.
Value only, reported thousands	$4,892	$4,010	$3,923	New Zealand $87.

See footnotes at end of table.

Table 2.—China: Apparent exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Destinations, 1983	
			United States	Other (principal)
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	1,787	2,638	--	Hong Kong 1,268; Japan 1,003.
Artificial:				
Corundum	10,204	10,275	1	Hong Kong 7,032; West Germany 1,829; Japan 1,092.
Silicon carbide	1,462	650	--	All to Hong Kong.
Dust and powder of precious and semiprecious stones				
value, thousands	$34	$48	$48	
Grinding and polishing wheels and stones	3,762	2,784	NA	Hong Kong 1,093; Indonesia 1,021; Singapore 188.
Asbestos, crude	5,065	3,050	--	Singapore 1,212; Indonesia 1,205; Japan 460.
Barite and witherite	833,164	781,830	705,749	Japan 44,652; West Germany 11,699; Netherlands 11,545.
Boron materials:				
Crude natural borates	323	62	1	Mainly to Pakistan.
Oxides and acids	3,718	2,349	--	Japan 1,548; Pakistan 232; Hong Kong 173.
Cement	604,987	290,073	520	Hong Kong 285,559; Pakistan 3,600.
Chalk	4	--	--	
Clays, crude	210,703	213,873	38	Japan 114,573; Hong Kong 86,649; West Germany 4,042.
Cryolite and chiolite	267	83	83	
Diamond:				
Gem, not set or strung value, thousands	$7,799	$8,012	$108	Belgium-Luxembourg $5,750; Hong Kong $1,420; Japan $663.
Industrial stones do	$1,294	$1,698	$102	Belgium-Luxembourg $1,588.
Diatomite and other infusorial earth	32	2	--	All to Sweden.
Feldspar, fluorspar, related materials	423,245	367,474	27,514	Japan 265,107; West Germany 45,424; Hong Kong 16,267.
Fertilizer materials: Manufactured:				
Ammonia	1,059	1,671	--	All to Hong Kong.
Nitrogenous	1,465	1,386	--	Hong Kong 1,280.
Phosphatic	13,047	15,796	--	Japan 15,791.
Potassic	28	2	2	
Unspecified and mixed	1,366	2,725	2	Japan 2,597; Netherlands 100.
Graphite, natural	48,334	46,291	9,205	Japan 27,769; United Kingdom 4,795; France 1,455.
Gypsum and plaster	4,336	6,310	--	Hong Kong 4,974; Indonesia 555; Singapore 480.
Kyanite and related materials	--	50	--	All to Japan.
Lime	36,985	37,473	--	Hong Kong 35,394; Singapore 2,069.
Magnesium compounds:				
Magnesite	304,976	285,387	7,688	Japan 178,963; West Germany 36,831; Hong Kong 18,571.
Oxides and hydroxides	2,911	19,073	--	United Kingdom 10,733; Japan 6,376; France 1,064.
Mica:				
Crude including splittings and waste	11,801	14,029	--	United Kingdom 11,173; West Germany 1,595.
Worked including agglomerated splittings	65	243	NA	United Kingdom 89; Indonesia 78; France 24.
Nitrates, crude	29	--	--	
Phosphates, crude	30	5	--	All to New Zealand.
Phosphorus, elemental	2,850	NA		
Pigments, mineral:				
Natural, crude	1,820	1,852	--	Japan 907; Indonesia 520; Hong Kong 355.
Iron oxides and hydroxides, processed	4,728	4,162	--	Indonesia 1,397; Hong Kong 1,223; Pakistan 695.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$3,844	$3,142	$557	Hong Kong $1,340; Japan $1,051.
Synthetic do	$106	$111	$17	Netherlands $51; Hong Kong $36.
Salt and brine	113,120	737,929	--	Japan 607,955; Hong Kong 94,458; Philippines 29,955.
Sodium compounds, n.e.s.:				
Carbonate, natural and manufactured	3,679	5,848	--	Hong Kong 4,997; Philippines 400.
Sulfate, natural and manufactured	61,529	58,814	--	Japan 29,615; Hong Kong 14,494; Singapore 8,280.

See footnotes at end of table.

Table 2.—China: Apparent exports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Destinations, 1983	
			United States	Other (principal)
NONMETALS —Continued				
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	69,518	84,812	--	Japan 73,589; Hong Kong 7,278.
Worked	20,617	15,646	(2)	Japan 6,979; Singapore 4,362; Hong Kong 3,155.
Dolomite, chiefly refractory-grade	100	NA		
Gravel and crushed rock	561,888	1,414,351	2	Hong Kong 1,410,946.
Limestone other than dimension	37,670	28,625	--	Hong Kong 28,525.
Quartz and quartzite	35,979	13,580	5	Japan 11,347; Hong Kong 1,743.
Sand other than metal-bearing	827,579	987,318	--	Hong Kong 987,268.
Sulfur:				
Elemental:				
Crude including native and byproduct	725	43	--	Hong Kong 40.
Colloidal, precipitated, sublimed	103	4	--	All to Pakistan.
Sulfuric acid	3,439	3,914	--	All to Hong Kong.
Talc, steatite, soapstone, pyrophyllite	523,065	528,124	48	Japan 469,810; Hong Kong 14,770; Indonesia 14,019.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	1,441	13,698	--	Pakistan 11,700; Japan 1,302.
Carbon: Carbon black	5,610	2,352	--	Hong Kong 996; Indonesia 609; Japan 400.
Coal:				
Anthracite and bituminous thousand tons	3,693	4,411	18	Japan 3,799; Hong Kong 451; France 107.
Lignite including briquets	1,108	933	--	All to Japan.
Coke and semicoke	44,793	28,340	1	Thailand 26,095; Hong Kong 676; Indonesia 500.
Petroleum:				
Crude thousand 42-gallon barrels	93,320	92,694	2,642	Japan 68,015; Brazil 19,689.
Refinery products:				
Liquefied petroleum gas 42-gallon barrels	12	38,558	--	All to Japan.
Gasoline thousand 42-gallon barrels	20,180	23,341	10,682	Japan 10,914; Singapore 1,175; Hong Kong 423.
Mineral jelly and wax do.	615	753	(7)	Singapore 311; Hong Kong 93; Pakistan 90.
Kerosine, jet fuel, white spirit do.	4,186	4,130	--	Hong Kong 2,670; Japan 1,064.
Distillate fuel oil do.	10,290	8,844	--	Hong Kong 5,118; Singapore 2,122; Japan 850.
Lubricants do.	477	417	--	Hong Kong 163; Thailand 150; Singapore 46.
Residual fuel oil do.	2,355	2,615	--	Japan 1,368; Hong Kong 1,243.
Bitumen and other residues do.	82	82	--	Hong Kong 56; Pakistan 25.
Bituminous mixtures do.	1	2	--	Mainly to Hong Kong.
Petroleum coke do.	761	758	--	All to Japan.

[p]Preliminary. NA Not available.

[1]Table prepared by Audrey D. Wilkes. Owing to a lack of official trade data published by China, this table should not be taken as a complete presentation of this country's mineral exports. These data have been compiled from United Nations information and data published by the partner trade countries.

[2]Unreported quantity valued at $4,000.

[3]Unreported quantity valued at $81,000.

[4]Unreported quantity valued at $1,000.

[5]May include platinum-group metals.

[6]Unreported quantity valued at $1,074,000.

[7]Less than 1/2 unit.

Table 3.—China: Apparent imports of selected mineral commodities[1]

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Sources, 1983	
			United States	Other (principal)
METALS				
Alkali and alkaline-earth metals	24	1	--	Mainly from Italy.
Aluminum:				
Oxides and hydroxides	31,100	73,580	--	All from Japan.
Metal including alloys:				
Scrap	63	170	--	Netherlands 155.
Unwrought	17,583	63,207	55,950	Yugoslavia 3,085.
Semimanufactures	13,777	14,499	16	Japan 5,066; New Zealand 5,046; Brazil 1,488.
Chromium:				
Ore and concentrate	108,361	131,356	--	Turkey 124,300; Philippines 7,056.
Oxides and hydroxides	346	636	452	Japan 180.
Cobalt: Oxides and hydroxides kilograms	20	NA		
Copper:				
Ore and concentrate	54,597	43,861	--	Philippines 26,974; Papua New Guinea 14,371.
Metal including alloys:				
Scrap	11,892	85,858	--	Japan 84,775.
Unwrought	35,708	96,289	2,155	Canada 67,137; West Germany 18,132; Belgium-Luxembourg 8,727.
Semimanufactures	1,567	3,117	24	Japan 1,958; Hong Kong 1,021.
Gold: Metal including alloys unwrought and partly wrought troy ounces	32,674	20,869	--	Philippines 16,193; Hong Kong 4,474.
Iron and steel:				
Iron ore and concentrate	NA	5	--	All from Brazil.
Metal:				
Scrap	2,269	1,382	643	Hong Kong 708.
Pig iron, cast iron, related materials	326	797,250	NA	Brazil 395,724; Japan 293,144; Pakistan 108,155.
Ferroalloys:				
Ferromanganese	--	500	--	Japan 250; Norway 150; West Germany 100.
Unspecified	3	20,790	--	Brazil 8,540; Norway 7,153; Japan 2,000.
Steel, primary forms	270,012	601,097	--	Japan 548,578; Hong Kong 22,617; Netherlands 14,839.
Semimanufactures thousand tons	3,172	8,259	10	Japan 6,124; West Germany 630; Brazil 469.
Lead:				
Oxides	29	NA		
Metal including alloys:				
Unwrought	120	1,327	2	Canada 999; Japan 299.
Semimanufactures	21	30	--	Japan 23; Hong Kong 7.
Lithium: Oxides and hydroxides	2	NA	--	
Manganese: Oxides	288	1,030	NA	Japan 1,018.
Molybdenum: Metal including alloys, all forms kilograms	12	191	--	Mainly from Japan.
Nickel:				
Ore and concentrate	NA	38,322	--	New Caledonia 38,317.
Metal including alloys, all forms	274	853	--	United Kingdom 766.
Platinum-group metals: Metals including alloys, unwrought and partly wrought troy ounces	64	295	(2)	Japan 166; West Germany 129.
Rare-earth metals kilograms	NA	1,500	--	All from Japan.
Silver:				
Ore and concentrate do.	NA	789	--	All from Canada.
Metal including alloys, unwrought and partly wrought thousand troy ounces	(2)	1,440	1	United Kingdom 1,402.
Tin:				
Oxides	15	26	--	All from Japan.
Metal including alloys:				
Unwrought	45	12	--	Japan 8; Hong Kong 4.
Semimanufactures	56	49	3	Hong Kong 39.
Titanium: Oxides	8,891	5,260	734	Japan 4,378; Hong Kong 146.
Tungsten: Metal including alloys, all forms	1	4	NA	Mainly from Japan.
Uranium and/or thorium: Ore and concentrate value, thousands	NA	$1	$1	
Zinc:				
Ore and concentrate	NA	15,843	--	All from Canada.
Oxides	13	256	--	Hong Kong 127; Japan 76; Singapore 52.
Metal including alloys, all forms	27,215	86,134	91	Canada 54,244; Japan 11,670; West Germany 4,847.

See footnotes at end of table.

Table 3.—China: Apparent imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Sources, 1983	
			United States	Other (principal)
NONMETALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc	4	143	103	Hong Kong 34.
Artificial: Corundum	21	69	20	Hong Kong 27; West Germany 18.
Dust and powder of precious and semiprecious stones excluding diamond value, thousands	$68	$30	$25	Hong Kong $5.
Grinding and polishing wheels and stones	75	137	1	Hong Kong 91; Japan 40.
Asbestos, crude	114	834	--	Canada 734; Japan 86.
Barite and witherite	1,138	NA		
Boron materials: Oxides and acids	10	20	--	Italy 18.
Cement	245,216	1,328,842	--	Japan 879,673; Hong Kong 243,806; U.S.S.R. 204,000.
Clays, crude	3,640	2,096	721	Japan 1,186; Singapore 126.
Diamond:				
Gem, not set or strung value, thousands	$2,848	$2,869	$109	United Kingdom $1,602; Belgium-Luxembourg $995; Hong Kong $155.
Industrial stones do.	$4,129	$5,696	$31	Belgium-Luxembourg $5,639; United Kingdom $23.
Diatomite and other infusorial earth	136	99	72	West Germany 15; Japan 9.
Feldspar, fluorspar, related materials	--	300	--	All from Hong Kong.
Fertilizer materials: Manufactured:				
Ammonia	5	8	--	West Germany 5; Hong Kong 3.
Nitrogenous thousand tons	1,343	982	284	Singapore 115; Italy 106; Hong Kong 105.
Phosphatic	[4]104,050	533,808	280,958	Morocco 219,050; Turkey 33,800.
Potassic	112,102	650,545	--	Canada 536,539; West Germany 68,400; Singapore 38,085.
Unspecified and mixed	702,734	833,545	584,556	Italy 72,627; Finland 66,326; West Germany 63,673.
Graphite, natural	9	78	31	Japan 44.
Gypsum and plaster	87	5,578	16	Thailand 5,500.
Lime	319	26	3	Hong Kong 23.
Magnesium compounds: Magnesite	--	19	--	All from West Germany.
Mica:				
Crude including splittings and waste	19	18	--	All from Hong Kong.
Worked including agglomerated splittings	3	13	--	Mainly from Hong Kong.
Phosphates, crude	354,136	49,738	--	Algeria 49,517.
Pigments, mineral: Iron oxides and hydroxides, processed	112	713	102	Hong Kong 501; Belgium-Luxembourg 99.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$5,278	$3,994	$4	Hong Kong $2,734; West Germany $823; Switzerland $353.
Synthetic do.	$27	$14	--	Japan $13.
Salt and brine	503	247	--	Hong Kong 241.
Sodium compounds, n.e.s.:				
Carbonate, natural and manufactured	6,315	225,360	59,698	Poland 71,644; Hong Kong 35,615; West Germany 30,000.
Sulfate, natural and manufactured	5	8	--	Hong Kong 6; Japan 2.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	25	1,058	--	Brazil 665; Hong Kong 179; Italy 124.
Worked	394	1,219	NA	Hong Kong 1,201.
Limestone other than dimension	143	243	--	All from Hong Kong.
Sand other than metal-bearing	88	255	--	Hong Kong 191; Japan 29.
Sulfur:				
Elemental, crude including native and byproduct	2,103	301,556	511	Canada 217,027; Poland 82,000.
Sulfuric acid	102,825	243,666	--	Japan 213,780; Philippines 29,815.
Talc, steatite, soapstone, pyrophyllite	139	230	--	All from Hong Kong.
MINERAL FUELS AND RELATED MATERIALS				
Asphalt and bitumen, natural	14	30	--	Do.
Carbon: Carbon black	688	947	--	West Germany 555; Japan 370.
Coal:				
Anthracite and bituminous	59,833	19,108	1,636	Canada 17,472.
Lignite including briquets	62	--	--	
Coke and semicoke	--	3,806	--	Japan 3,800.

See footnotes at end of table.

Table 3.—China: Apparent imports of selected mineral commodities[1] —Continued

(Metric tons unless otherwise specified)

Commodity	1982	1983[p]	Sources, 1983	
			United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS —Continued				
Petroleum:				
Crude ——42-gallon barrels	(3)	--		
Refinery products:				
Liquefied petroleum gas value, thousands	$399	$685	$3	Hong Kong $677.
Gasoline 42-gallon barrels	4,607	10,758	42	Hong Kong 8,969; West Germany 960; Algeria 756.
Mineral jelly and wax do	787	2,175	16	Hong Kong 1,509; West Germany 362.
Kerosine and jet fuel do	17,236	18,625	--	Yugoslavia 15,159; Hong Kong 3,466.
Distillate fuel oil ——do	41,149	146,164	--	Hong Kong 145,873.
Lubricants ——do	37,013	47,361	(4)	Hong Kong 20,182; Japan 14,607; Singapore 4,900.
Residual fuel oil ——do	314,938	521,109	--	Hong Kong 509,503; Ivory Coast 11,076.
Bitumen and other residues do	254	1,600	--	West Germany 1,327; Hong Kong 273.
Bituminous mixtures do	454	618	--	West Germany 364; Canada 158.
Petroleum coke ——do	1,100	--	--	
Unspecified ——do	12,278	189	--	All from Hong Kong.

[p]Preliminary. NA Not available.

[1]Table prepared by Audrey D. Wilkes. Owing to a lack of official trade data published by China, this table should not be taken as a complete presentation of this country's mineral imports. These data have been compiled from United Nations information and data published by the partner trade countries.

[2]Unreported quantity valued at $157,000.

[3]Unreported quantity valued at $842,000.

[4]Excludes unreported quantity imported from the United States valued at $6,202,000.

[5]Revised to zero.

[6]Unreported quantity valued at $402,000.

China's minerals and metals trade in 1984 was as follows, in metric tons:

Commodity	Quantity
EXPORTS	
Aluminum products	5,772
Antimony	16,727
Cement	174,119
Coal	7,212,000
Coke	349,000
Copper products	7,777
Petroleum, crude	20,747,000
Petroleum products	5,538,000
Salt	1,038,000
Steel products	223,223
Tin	2,736
Tungsten:	
Metal	78
Ore	18,803
Zinc	1,431
IMPORTS	
Aluminum	252,000
Cement	3,022,000
Coal	2,379,000
Copper	264,000
Iron ore	5,720,000
Soda ash	851,351
Steel products	12,036,000
Zinc	225,000

COMMODITY REVIEW

METALS

China's mineral industry accounted for about 32% of the country's gross value of industrial output, estimated to have been $350 billion in 1984. Input to the gross value of industrial output by the mining and metallurgical sector was as follows: chemicals, 12%; metallurgical industry, 9%; petroleum, 5%; building materials, 4%; and coal, 3%. During the year, production of energy resources reached peak levels, while output by the building, chemical, and metallurgical industries increased 10% to 15%. Administration of minerals and metals in China is invested with the Ministries of Geology and Minerals, Building Materials Industry, Coal Industry, Chemical Industry, Metallurgical Industry, Nuclear Industry, Petroleum Industry, and the China National Nonferrous Metals Corp. (CNNM).

CNNM, which reports to the State Council, is responsible for 236 enterprises, of which 132 are metal producing companies. The marketing arm of CNNM is the China National Nonferrous Metals Import-Export Corp., and the engineering arm is China Nonferrous Metals International Engineering Corp. Specialized companies include the China Huaxing Tungsten Corp., Jiangxi Copper Corp., Jinchuan Gold Corp., Shaanxi Jindiupo Molybdenum Corp., Silver Nonferrous Metals Corp., and Yunnan Tin Corp. General entities include Beijing Nonferrous Metals Industrial Corp., Guangdong Nonferrous Metals Prospecting Corp., Guangxi Prospecting Corp., Nanning Corp., and Shenyang Corp.[17]

By Chinese classification, the 10 major nonferrous metals are aluminum, antimony, copper, lead, magnesium, mercury, nickel, tin, titanium, and zinc. In addition, ferroalloying metals are considered by definition in the nonferrous category. China has not disseminated numeric data on nonferrous metals production. Total output is estimated at about 1.3 million tons in 1984. China's production of nonferrous metals ranks sixth in world output.[18] Output in 1984 was 8% higher than in 1983. Between 1985 and 1990, output is expected to grow at an annual rate of 10% as a result of expanding primarily aluminum, copper, lead, and zinc production. China has rich resources of nonferrous metals in terms of variety and quantity. Although output is inadequate to meet domestic demand, there is the potential for significant production increases.

Aluminum.—China's aluminum consumption is probably close to 600,000 tons per year, with two-thirds provided by domestic production and the remainder from imports. China has large aluminum resources with reserves of 1.2 billion tons of bauxite. The largest reserves are in Shanxi, which accounts for about 25% of the total reserves in the country.

China's newest alumina-aluminum complex is in Guiyang, Guizhou, which was a whole plant purchase from Nippon Light Metal Co. Ltd. of Japan. Although construction was completed in April 1983, metal output has not reached the installed capacity of 80,000 tons per year. Difficulties at the alumina plant were being rectified, and alumina had to be imported for feed to the electrolytic cells. Both in 1983 and 1984, production of alumina failed to meet the annual planned quotas.

The aluminum facility at Zhengzhou, Henan, was undergoing modification to expand capacity. Construction of China's largest plant was under way at Xiaoyi, Shanxi. A small 10,000-ton-per-year refinery was being planned for construction at Lanzhou, Gansu. An aluminum plant was to be constructed at Baiyin, Gansu, in the seventh 5-year plan (1986-90).

Reserves of bauxite in western Henan are estimated at 380 million tons. Plans were being considered to develop a mine of 30,000 to 60,000 tons annual output near Xinan, which has 120 million tons of bauxite grading 50% to 80% alumina. A small electrolytic plant (10,000 to 20,000 tons annually) as well as an alumina plant was to be included in the project. China was also to receive technical assistance from Japanese companies for updating the smelting technology at the Qingtongxia works in Ningxia.

A bauxite deposit with a reserve of more than 200 million tons was to be developed in the seventh 5-year period (1986-90) in Pingguo, Guangxi. There is shallow overburden making the operation suitable to surface mining. Water, electricity, transportation, and other infrastructure are available to the area. An aluminum plant, described as one of China's largest, was also included in the plan. CNNM and the regional government are to finance the initial phase of the project's construction.

Copper.—In 1984, China produced about 400,000 tons of copper and imported about 264,000 tons, according to other sources. Yongping Mine in Jiangxi is one of China's

key projects. Production level at full capacity, expected in 1985, will be 86,000 tons of concentrate per year (19,000 tons of copper content). The major components installed include a washing plant, a flash smelter, acid producing equipment, a powerplant, a 110,000-volt transmission line to the mine and plant, a mine railway, and a highway bridge spanning the Xinjiang River south of the plant. The Yongping facility is part of the Dexing copper complex, which will be one of the nation's largest copper producing facilities with eventual output of copper at 200,000 tons per year. The copper sulfide deposits in the mountains of northeastern Jiangxi constitute one-fifth of China's reserves of copper. The smelter of Guixi, Jiangxi, a whole plant purchase from Japan, will produce 70,000 tons of copper per year. The Guixi facility processes Dexing concentrate to produce 360,000 tons of copper sulfate annually. Initial metal production from Guixi is expected in September 1985.

With Japanese cooperation, detailed exploration of copper occurrences in Anqing, Anhui, was to be completed by July 1985. Surveying was to include 850 meters of drift work and 4,200 meters of boring. Foreign participation was expected in developing a copper mine at Anqing, as well as for a copper mine at Duobao, Heilongjiang. The porphyry copper mining project in Heilongjiang (Nenjiang County) would have an ore dressing capacity of 30,000 tons per day. The output of copper, gold, and silver would be for the domestic market, and byproduct molybdenum would be exported.

Gold and Silver.—According to China Gold Co., gold output has increased substantially in China, reaching an annual growth rate of 10%.[19] Permission was granted in 1984 for individuals to mine gold. The Chinese Government estimated that the production of gold by 40,000 individuals and an equal number working in mines run by local governments or collectives account for nearly one-half of the country's total production.

Gold production in 1984 was estimated at 1.9 million troy ounces with 25% of the output from Shandong. Gold production in Heilongjiang increased to about 137,000 troy ounces compared with 121,400 troy ounces in 1983. The drive to increase gold production is a Government effort to ease its financial burden in China's modernization program. At yearend, China's gold bullion reserves remained at 12.67 million troy ounces.

Gold was found in Hitai, northwest of Zhaoqing, Guangdong. Seven gold veins were discovered having lengths of 100 to 600 meters, a width of 0.6 to 2.5 meters, containing about 10 grams of gold per ton. At Gaocun, Guangdong, there is a gold occurrence in which one vein measures 550 meters by 3 meters. This deposit has 13 grams of gold per ton and is estimated to have gold reserves of 6 tons.

There is a long history of gold mining in the Greater Hinggan Mountains in Heilongjiang. A 450-kilometer trail from Mohe, the northernmost town in China, is referred to as the "Gold Road," along which gold has been tapped in the Laogon Gully and Mount Fuke. In this area, three mines were slated for expansion—Laogon placer mine, the Tuanjiegon Gully Mine, and the Fuke Shan placer mine.

The Zhaoyuan gold mine in Shandong is China's largest gold mine with an annual gold production capacity of 80,000 troy ounces. Other large gold mines in Shandong are Canzhuang, Fushan, Jiaojia, Rushan, Weifang, Xincheng, and Yinun. For the past 6 years, gold production in Shandong has increased an average of 8.3% per year with output in 1984 up by 11%. Five mines—Jiaojia, Rushan, Xincheng, Yinan, and Zhaoyuan—collectively have a daily ore handling capacity of 2,250 tons. Development of the Sanshandao Mine facing Laizhou Bay was expected to be completed in 1987. This mine was to produce 1,500 tons of ore per day.

In 1984, a gold occurrence was found in southwest Shaanxi on the upper reaches of the Jialing River near Lueyang County. A deposit measured 20 kilometers long, 100 meters wide, and 10 meters thick. The deposit, with an estimated reserve of 10 tons of gold, was reported in the southern foot of the eastern face of Yuheng Mountain in Fanshi, Shanxi.

Geologic surveys conducted in 1984 reported new discoveries of silver with an estimated reserve of 5,600 tons. In addition, the lead-zinc deposit in Guixi, Jiangxi, could contain as much as 10,000 tons of silver.

The first set of gold coins was issued by the Bank of China in September 1979 to mark the 30th anniversary of the founding of the People's Republic of China. By the end of 1983, the bank had issued 18 sets of gold and silver coins and souvenir badges, including 3 sets of gold and silver coins of the giant panda. In 1984, three sets of

commemorative coins were issued. A set of silver coins to mark China's participation in the 23d Olympiad; a set of gold and silver coins for the 10th anniversary of International Women; and a set of gold coins of the giant panda. Coins issued by the Bank of China have averaged 22 karats for gold and 90% for silver.

Iron and Steel.—The Ministry of Metallurgical Industry, which encompassed all metallurgical enterprises in China until it was restructured in 1983, only had jurisdiction for dolomite, iron, and steel in 1984. China was the world's fourth largest producer of steel. There were 13 large iron and steel complexes, each with an annual capacity over 1 million tons. The Anshan iron and steel complex, the largest, produces about 6.9 million tons annually, followed by Wuhan, 3 million tons; Capital, 2.1 million tons; Manshan, 1.4 million tons; and Shanghai Municipality, with 10 mills collectively producing close to 4.8 million tons. In addition, there are 38 mills, each with the capability of producing 100,000 tons to 1 million tons of steel annually. A few of these have only the technical levels of the 1930's, while most of them have the technical level prevailing in the 1950's and 1960's.

Pig iron production in 1984 was close to 40 million tons. Presently, iron ore consumption per ton of pig iron produced averages about 1,830 kilograms. China's iron ore is low grade, averaging 30% to 35% iron content. Annually, mine production is close to 120 million tons, according to other sources. In 1984, China imported 5.7 million tons of iron ore to supplement domestic production. China has contracts with Australian companies for the purchase of 4 million tons of iron ore, and when the Baoshan iron and steel complex is completed in September 1985, Australia will be one of China's leading iron ore suppliers.

Of the nation's iron ore output, 80% is captive production by the large iron and steel complexes. Iron deposits are unevenly distributed in the country. There are over 43 billion tons of iron ore deposits in Anshan (Liaoning), Baotou (Nei Monggol), Benxi (Liaoning), Panzhihua (Sichuan), Qianan and areas in eastern Hebei, Shanxi, and eastern Shandong while other areas have little or none. Ore deposits also differ in quality. Deposits in Qianan (Hebei) and areas in eastern Hebei are large, shallow, and easy to mine and separate. Producing 1 ton of 68% iron ore in these areas costs about $15. On the other hand, the cost to produce a 65% ore in Ekon, Shanxi, is about $30.

Moreover, technology and equipment lag by 20 to 30 years. Mine equipment has small capacity, poor performance, and low efficiency. The annual output of ore in the large mines is 6 to 7 million tons, while for others, it is less than 1 million tons. Major mines are equipped with 4- to 4.6-cubic-meter electric shovels and 20- to 32-ton trucks. Only the Benxi iron and steel complex has begun equipping its strip mine at Nanfen (Liaoning) with 7.6-cubic-meter electric shovels and 100- to 200-ton electric trucks. China's small- and medium-size mines are equipped usually with 1- to 4-cubic-meter electric shovels and 8- to 20-ton trucks. Because of the uniformity in equipment, the productivity of the large mines was not much more than small mines. In addition, inadequate equipment has limited the excavation rate in Chinese strip mines.

In mining and ore dressing, equipment size was to be commensurate with capacity. The Shuichang (Beijing Shi) Mine of the Capital steel complex and the Qidashan Mine of the Anshan steel complex are expanding the capacity of its mines and ore dressing plants to 20 to 30 million tons annually. These operations were not installing the 200- to 400-ton ball mills, but were installing the 100-ton ball mills for use throughout the country. To raise efficiency, the iron ore sector was to consider using modern equipment, using larger equipment, increasing the utilization rate of equipment, and lengthening the replacement time. In addition, it was proposed that the mining enterprises and iron and steel complexes should be managed separately. This would ensure greater decision making power in increasing production, raising efficiency, and ensuring even distribution.[30]

An iron ore deposit was discovered in Heishan County, Liaoning. The deposit, estimated to contain 22 million tons of iron ore, measured 45,000 meters long by 1,000 meters wide.

After 7 years of surveying, a 300-million-ton iron ore reserve was verified in the west section of the Makeng Mine in Longyan, Fujian. In 1972, more than 100 million tons was identified in the middle section of the Makeng Mine.

In 1984, the Jiuquan steel mill in Gansu installed a high-intensity magnetic separation line to handle 1.4 million tons of low-grade hematite per year to produce 500,000 tons of concentrate. Previously, the low-grade hematite, which represented 45% of the ore resources, was rejected.

Materials consumed in iron and steel production were as follows:

Per ton of pig iron:		
Iron ore	kilograms	1,830
Fuel	do.	575
Coke	do.	390
Per ton of steel:		
Iron and steel (open hearth)	do.	1,095
Iron and steel (electric furnace)	do.	1,034
Power (electric furnace)	kilowatt hours	625
Iron and steel (side-blown converter)	kilograms	1,171
Iron and steel (top-blown converter)	do.	1,143

In addition to the major iron and steel enterprises, China has 1,078 medium- and small-scale iron and steel enterprises, of which 56 are considered key enterprises, 25 are classified as independent key mines, and 21 employ 10,000 or more people. Total employment in these enterprises numbered 1.1 million.

Table 4.—China: Number of small- and medium-size iron and steel enterprises in 1984, by area and kind

Area[1]	Iron ore mines	Coal and coke	Pig iron	Iron and steel	Rolling mills	Finished products
East	42	13	39	160	39	8
North	32	6	51	53	31	4
Northeast	13	2	15	93	69	13
Northwest	7	8	12	25	6	1
South-central	32	8	38	101	36	10
Southwest	11	--	45	40	12	3
Total	137	37	200	472	193	39

[1]Excludes municipalities of Beijing, Shanghai, and Tianjin.

By the end of 1980, total investment throughout the country was about $9 billion, which included installation of 660 blast furnaces with an average individual inner volume of 28 cubic meters, 420 steel rolling mills, 144 coke ovens, and 55 sintering installations. Equipment at China's small- and medium-size iron and steel enterprises was as follows:

	Small	Medium
Blast furnaces:		
Number	604	75
Volume, thousand cubic meters	150	140
Converters:		
Number	54	82
Capacity, metric tons	171	625
Electric furnaces:		
Number	302	80
Capacity, metric tons	638	331
Open-hearth furnaces:		
Number	--	2
Capacity, metric tons	--	53
Rolling mills: Number	381	130
Sintering plants: Number	46	43
Coke ovens: Number	88	49

By percent of national output, the small- and medium-size iron and steel enterprises accounted for the following outputs in 1984: steel products, 32%; coke, 30%; pig iron, 27%; iron ore, 25%; and steel, 18%. The Government encouraged this sector of the iron and steel industry to lower coke consumption to reduce the cost of steel production, to integrate crude steel output with production of semimanufactures, and to balance consumer cost with true cost of production.[21]

In recent years, the iron and steel sector has stepped up energy management for fuel conservation. The steel industry accounted for about 12% of the total national energy

consumption. China's energy consumption per ton of steel is higher than that in foreign countries. The higher average energy consumption figures relative to Japan were as follows: steel rolling, 166%; prerolling, 109%; sintering, 40%; iron smelting, 17%; steel smelting in Bessemer converters, 14%; and coking process, 12%. Consumption of scrap steel is 10% to 20% lower than in most of the major steel producing countries. As such, there is a higher usage of molten iron and, hence, higher energy consumption. The average energy consumption per ton of steel produced has decreased 21% from 1977 to 1979. However, further decreases are necessary to make China's industry competitive with foreign operations.[33]

China's largest steel producer is the Anshan iron and steel complex in Liaoning. Anshan has five mines with a collective annual capacity of 23 million tons of iron ore. The complex has 20 open-hearth furnaces, 13 rolling mills, 10 blast furnaces, and 3 steel foundries. Annual output capacity is 7 million tons for steel and 4.4 million tons for rolled steel. Technical renovation at Anshan began in 1981 with the introduction of computers to automate steelmaking and other processes. Technology and equipment for Anshan's modernization have been purchased from the Federal Republic of Germany, Japan, and the United States. Installation of equipment, to be completed late in the decade, will raise annual steel production capacity to 8 million tons in 1990.

In the early 1970's, the Wuhan steel mill in Hubei imported equipment for its rolling mill from the Federal Republic of Germany and Japan. Because of the shortage of power, raw materials, and spare parts, the mill has not been able to operate at full capacity. The State Economic Commission convened a conference in midyear 1984 with officials from various ministries to coordinate resolving the difficulties. Lack of power causes the rolling mill to suspend operations for 3 hours daily. Problems at the mill were reported to be resolved to allow full operation by 1985.[33]

Construction of China's newest iron and steel complex occupies a 12-square-kilometer site at Baoshan, outside of Shanghai. First-phase construction was expected to be completed in September 1985 and includes installation of a 22-million-ton-handling-capacity wharf, a 4,063-cubic-meter blast furnace, a 4.9-million-ton sintering plant, a 3-million-ton blooming mill, a powerplant, a converter, a steel rolling mill, and a 500-ton-per-year seamless steel tube facility. Steel output capacity at Baoshan upon completion of the first-phase construction will be 3.35 million tons of steel. The Baoshan site was chosen because convenient shipping conditions make it easy to obtain iron ore and other materials from other areas of China and from Australia and Brazil. In addition, most of the steel output will be consumed in Shanghai, China's largest industrial center.

In November 1984, an economic and technical cooperation agreement was concluded between Australia and China for building a steelworks in the Beicang Port area of Tianjin. Planned annual capacity for the mill is 500,000 tons of crude steel.

Other activities in the iron and steel sector included purchase of technology and equipment for wire rod production at the Xiangtan iron and steel mill in Hunan; acquisition of an electromelt arc furnace for the ferroalloy plant at Nangxi in Zhejiang; powder metallurgy equipment for the steel mill at Jinan, Zhejiang; cold-rolling, tube casting, and other equipment for the steel plant at Dalian, Liaoning; testing and measuring equipment for the Wuxi steel mill in Anhui; rolling equipment for the Shenyang rolling mill in Liaoning; high-speed wire rod equipment and continuous casting machinery for the Qingdao steel plant in Shandong; expansion of the production capacity of hot-rolled seamless steel tube at the Chongqing steel complex in Sichuan; equipment purchase for wire rod and special steel wire production at the Shaanxi steel plant; and plans for production of 100,000 tons per year of ferrosilicon at the Gansu ferroalloy plant.

Lead and Zinc.—China has large resources of lead and zinc, which are widely distributed throughout the country. Reserves of contained lead in ore are estimated to exceed 20 million tons and for contained zinc, over 53 million tons. Geologic surveys in 1984 have uncovered new reserves of 2 million tons of lead and 3 million tons of zinc.

Development of two large lead-zinc mines continued. Completion of the lead-zinc mine in Cheng Xian, Gansu, was expected in 1985. This mine has confirmed reserves of 4 million tons of high-grade ore and inferred reserves of 10 million tons. When completed, Cheng Xian will have an annual output of 110,000 tons of lead-zinc concentrate.

Development of the lead-zinc deposit at Xitieshan, Qinghai, began in May 1982 and was also expected to be completed in 1985. Xitieshan was described as a large-scale mining project and to have rich reserves of high-grade lead-zinc ores mixed with small amounts of copper, gold, and silver.[34]

Two lead-zinc deposits were to be developed in Zhejiang. At Huangyan, plans were made to open a mine with a daily production capacity of 2,500 tons of lead and zinc. At Tiantai, the daily production capacity was to be 200 tons of lead, silver, and zinc. Construction was expected to begin in 1986. Beneficiation and extraction equipment was to be installed at the Qibaoshan iron sulfide mine in Hunan for the extraction of germanium, nickel, and zinc.

China's annual capacity to produce refined lead and zinc is estimated at 250,000 and 300,000 tons, respectively. The larger lead refinery capacity is in Shenyang, Liaoning, and Zhuzhou, Hunan; and for zinc, in Huhidao and Shenyang, Liaoning; Shaoguan, Guangdong; and Zhuzhou, Hunan. At the end of the sixth 5-year plan, China's annual capacity to refine lead was to reach 300,000 tons, and zinc, 375,000 tons.

Nickel.—China's largest nickel mine is at Jinchuan, Gansu, with reserves of 5 million tons of contained nickel. There are four main mining areas; mine No. 2 and the Longshou Mine are underground operations. The metallurgical complex began producing electrolytic nickel in 1964 as well as byproduct copper, gold, platinum-group metals, and silver. Production of electrolytic nickel surpassed the 10,000-ton-per-year barrier for the first time in 1983. Output in 1984 was expected to reach 17,000 tons. Jinchuan signed a licensing agreement with Outokumpu Oy of Finland for a flash smelter utilizing 350,000 tons per year of nickel concentrate. Jinchuan's cobalt extraction unit went into operation on July 10, 1984, and on August 13, the first batch of 200 kilograms of granular cobalt was produced.

A large nickel deposit was discovered in northern Xinjiang near the Ertix River. The deposit contains associated values of cobalt, gold, platinum-group metals, and silver. The Provincial government was expected to develop the deposit to boost output by its metallurgical industry.

Yunnan Province was seeking financial and technical assistance to establish a plant to produce 40,700 tons of sulfuric acid, 1,200 tons of nickel, 740 tons of copper, and 2.5 tons of cobalt annually. The output would be available for both domestic and foreign sales.

Rare-Earth Minerals.—China has rich resources of rare earths with verified reserves of 36 million tons, 90% of which are in the Baiyun Ebo Mine in Baotou, Nei Monggol. Production of rare-earth products is centered in Baotou, Nei Monggol; Lanzhou, Gansu; and Shanghai, with lesser production in Guangdong and Jiangxi Provinces. Annual production capacity for rare-earth chlorides in Gansu is 9,000 tons. China ranks second in the world in rare-earth production capacity and third in the world in total consumption.[35]

The consumption of rare earths is largely limited to electronics and metallurgy. China has been a pioneer to expand application and use of rare earths. For instance, rare-earth additives in fertilizers were studied in Hunan in the early 1970's. Initial studies demonstrated that these additives increased crop yield. A research center was established in Changsa, Hunan, to continue the study, and experiments were being conducted in Heilongjiang as well as Hunan to measure increased crop yield for cotton, paddy rice, peanuts, rubber, soybeans, sugar beets, and wheat.

Tin.—China's tin producing area stretches from Hunan and Jiangxi, south to Guangdong, and west to Guangxi and Yunnan, with the latter two being the main tin producing areas. The Gejiu tin mine in Yunnan was refurbished, and annual mine output raised to over 11,000 tons.[36] Guangdong ranked fourth in tin reserves in China, and the distribution of tin deposits was generally as follows: in the Lianhuashan northeasterly fault (cassiterite-sulfide ore); between the Heyuan and Lianhuashan Faults (cassiterite-quartz vein); in the east-westerly tectonic zone (tungsten-tin-quartz vein and skarn); and alluvial occurrences in eastern and western Guangdong. During a Provincial geological survey (1:200,000), measurings from river tailings and of soil revealed excellent prospects for finding new tin resources.

The Dayishan Xiangyuan tin mine in Hunan was seeking assistance in obtaining mining and beneficiation equipment and tin smelting technology. A mixed deposit with an estimated reserve of 1.3 million tons of lead, tin, and zinc was found at Nandan, in northwest Guangxi.

Other Metals.—The Anhua antimony mine in Hunan was to import equipment and technology to refine antimony ore.

Xinjiang was seeking fluorination equipment and technology for beryllium refining. Yunnan was seeking processing technology and equipment for annual production of 1 ton of germanium. The Gansu ferroalloy plant was seeking assistance for producing 100,000 tons per year of ferrosilicon. Heilongjiang was to develop a molybdenum deposit in Wudaoshan. The Guangzhou titania plant was to import technology and equipment to produce titania by the sulfate process.

NONMETALS

China possesses large resources of a wide variety of nonmetallic minerals. Output of many of these minerals are significant by world standards. Production of cement, dolomite, fertilizers, and limestone are primarily consumed domestically while much of the output of barite, fluorspar, magnesite, marble, and talc are exported.

Barite.—China's barite resources are in Fujian, Guangxi, Hubei, and Shandong. Guangxi is the largest producer, accounting for perhaps two-thirds of China's total output. Current production satisfies both domestic and export needs. Exports of barite peaked in 1982, reaching close to 1.1 million tons with about 65% of the shipments to the United States.

Cement.—In 1984, output of cement in China increased 12%, reaching 121 million tons. Because of increasing demand resulting from China's modernization and construction program, annual production of cement increased rapidly since 1981. Three large cement plants, each with an annual capacity of more than 1 million tons, are included in the key construction projects—the Jidong plant in Tianjin, the Huaichai in Jiangsu, and the Ningguo in Anhui. Construction of the 1.6-million-ton Jidong plant was completed in 1984. China's cement industry is large and widespread, but is dominated by small producing units. About 2,500 small enterprises account for 55% of the annual national output.

Two large cement plants were planned for construction in Anhui, both with a proposed 1-million-ton-per-year capacity. The Taoshan plant, Wuhu County, is convenient to limestone resources, water, and transport facilities. The Digang plant in Fanchang County borders the Chang Jiang and is also near rich limestone deposits. Both plants were also to have bagging facilities for shipping their output of cement.

Coal accounts for about 90% of the energy supply for China's cement industry. To increase energy conservation, efforts were being made to use rotary kilns with preheaters or precalcining burners. For instance, the Changxing Yangjiashan cement plant in Zhejiang was to install a coal-fired rotary kiln with a daily production capacity of 2,000 tons. On a smaller scale, the Guangji cement plant in Hubei was to install a vertical kiln with an annual capacity of 120,000 tons.

Clays (Bentonite).—Large occurrences of bentonite in China are in Liaoning, Guangxi, and Gansu. Heishan County, Liaoning, is a major producing area. The Heishan bentonite mine produces both calcium and sodium bentonite. The Heishan Mine and the Linan Mine in Zhejiang were importing equipment to expand the product line output of sodium bentonite. A bentonite deposit at Hexibao, Gansu, was scheduled for development.

Fertilizer Materials.—During the fourth 5-year plan, China purchased 13 large ammonia units, each with a daily capacity of 1,000 tons of ammonia. Installation of these plants was completed by September 1979. Despite these whole-plant purchases, China continued to be a large importer of nitrogenous fertilizers as well as phosphate and potash. Three nitrogenous fertilizer plants, all key construction projects, were scheduled to be completed in 1985 in Shanxi, Zhejiang, and Xinjiang. Domestic production in 1984 included 14 million tons of nitrogenous fertilizer, 3.5 million tons of phosphatic fertilizer, and 40,700 tons of potassic salts. In comparison, a total of 18 million tons of chemical fertilizer was applied during the year.

To balance the fertilizer ingredient ratio, phosphate production in Hubei, Guizhou, and Yunnan was being expanded. During the year, over 1 billion tons of new reserves of phosphate was reportedly found. Output of potash at the Qaihan Qinghai plant was to reach 200,000 tons in 1985 while two iron sulfide mines in Guangzhou and Nei Monggol were to be opened. In addition, equipment to produce 300,000 tons of ammonia annually was to be installed in the Ningxia chemical plant, an equal production capacity for the Guanzhou fertilizer plant in Guangdong, the chemical fertilizer plant at Ningbo, Zhejiang, and the Weihe chemical fertilizer plant in Heilongjiang. The Jinan plant in Zhejiang was to be refitted with new compression, pumping, and other pip-

ing equipment. Plans were also made to develop the Chengbu and Qibaoshan iron sulfide deposits in Hunan and the Xinan deposit in Henan.

Other Nonmetals.—During the year, geologic surveys uncovered new deposits of meerschaum, alkaline salts, and emeralds and sapphires in Hunan, Henan, and Jiangsu, respectively. In addition, new reserves of gypsum totaled 2.2 billion tons, of which 1.5 billion tons was contained in one large minefield in Jiangsu. New reserves of talc totaled 2.8 million tons; detailed exploration of the Liboshi occurrence in Shandong revealed a deposit of 1.5 million tons.

A 10,000-ton-per-year diatomite mine was to be developed in Changbai, Jilin. Mining and processing equipment were to be installed to exploit high-grade flake graphite at Yichang, Hubei, and the amorphous graphite deposit at Lutang, Hunan. Hunan was to obtain technology and processing equipment to process and produce meerschaum from the Liuyang sepiolite deposit.

China is a large producer of magnesite, and its resources and production at Da Shih-Qiao, Liaoning, is well established. Development of high-grade magnesite in Fushun, Liaoning, was under way to produce 50,000 tons per year beginning in 1985.

MINERAL FUELS

Coal.—China's coal resources are more than 3 trillion tons. Proven coal reserves are estimated at 780 billion tons (includes new finds in 1984), sufficient for a thousand years of mining at the present rate of production. Although coal is widely dispersed throughout the country, the richest resources are in Shanxi and Nei Monggol, which have collectively about one-half of China's proven reserves of coal. Shaanxi ranks third; its Shinmu Coalfield has 100 billion tons of coal reserves.

The new coal finds in 1984 were mainly in Anhui, Hebei, Heilongjiang, Henan, Liaoning, Nei Monggol, Shandong, and Shanxi. The Huodong Coalfield in southern Shanxi has 6 billion tons of coking coal. This rich deposit will be developed as a new base for coking coal. The stress on geologic prospecting was being placed on eastern China, which has developed industries and better transportation facilities. Surface mine development will be centered in Shinmu and four other coalfields.

Annual coal mining capacity added in 1984 totaled 18 million tons. New capacity included the south open pit of the Huolinhe Coalfield, Nei Monggol, with an output of 3 million tons, and the Xiqupingdong Mine, Gujiao Coalfield, Shanxi, 3 million tons. The Gujiao Coalfield was being developed into a large coking coal mining center. Opening of the Dongpeng coal dressing plant in the Xingtai mining area in Hebei increased annual dressing capacity by 1.8 million tons.

China has 1,834 coal mines. The major mines have output distributed by the state. Output by the numerous locally run mines is equivalent to 48% of national production. Production by local mines grew 11% to 370 million tons in 1984.

Shanxi was China's largest coal producing Province. Output in 1984 was over 160 million tons with over 110 million tons shipped out of the Province for consumption. Accordingly, 85% of Shanxi's rail freight volume and 70% of the road traffic was for coal transport. The planned coal output in 1985 was 164 million tons, and by the year 2000, the output was expected to be 360 to 400 million tons.

Capacity for the large coal producing areas in Shanxi for 1984 and 2000 was as follows, in million metric tons:

Area	1984	2000	
		Expansions	New mines
Datong	26.0	3.0	8.6
Yanquan	13.0	3.0	16.7
Xishan	10.0	2.4	--
Luan	5.5	2.6	12.0
Jincheng	5.0	2.2	12.0
Fenxi	5.0	3.0	7.2
Xuangang	1.8	--	.9
Huoxian	1.6	1.7	5.7
Pingshou	--	--	45.0
Xiangning	--	--	8.0
Lishi	--	--	5.0

Coal production in Shanxi is limited as a result of inadequate rail facilities. To overcome this restraint, transformation of the railways was to include electrification, double tracking, and new trunk lines and branches. The freight volume of Shanxi's railways was expected to grow from 137 million tons in 1983 to 400 million tons at the end of the century. As part of the overall development scheme, large powerplants were to be constructed and some existing ones expanded. In 1983, Shanxi produced 15 billion kilowatt hours; planned output in 2000 was 85 to 100 billion kilowatt hours.

Although groundbreaking for the Pingshuo Antaibao surface coal mine was sched-

uled for July 1, 1985, construction had begun on developing infrastructure for the project. Pingshuo, in Shanxi Province about 500 kilometers west of Beijing, is a joint venture between Occidental Petroleum Corp. of the United States and Chinese concerns. The minesite covers an area of 19 square kilometers and has eight coal seams with a total thickness of 40 meters. Coal reserves were estimated at 500 million tons. Total investment to develop the 15-million-ton-per-year mine was $650 million. According to the Ministry of Coal Industry, this is the largest U.S.-Sino cooperative project for coal mine development in China. Initial production was expected to begin in late 1986 with full production by 1987.

The development of five mines at the Gujiao Coalfield in Shanxi Province was to be completed by 1992, and total annual output capacity of the coalfield was to be 16.5 million tons with five coal washing plants. Covering 360 square kilometers, Gujiao Coalfield has six shallow and gently inclining coal seams with verified reserves of 4.5 billion tons, 70% of which is high-grade coking coal. The coal is low in ash and sulfur content and has a calorific value of more than 4,000 kilocalories per kilogram.

The 3-million-ton-per-year Xiqu Mine of the Gujiao Coalfield was put into production in December 1984. Output of this mine was to be used by the new iron and steel complex at Baoshan, near Shanghai, which was to begin operation in September 1985. Development of the Zherchengdi Mine was started at the end of 1982, and production was expected to begin in late 1986. Tunneling of the Malan Mine started in November 1983 and upon completion in 1987 will produce 4 million tons of coal per year. Development of the Dongqu Mine was expected to begin in late 1985 or early 1986, and for the Tunlan Mine in 1987. Part of the mining equipment has been purchased from the Federal Republic of Germany, the United Kingdom, and the United States.

To enhance transport from the Gujiao Coalfield to Taiyüan, the capital of the Province, a 15-kilometer feeder line was under construction; a new highway was being built; and the two existing highways were being widened. By 1990, annual coal transport capacity from the mines to Taiyüan was to be 20 million tons.

Large peat deposits were discovered on the Zoige Plateau, bordering Sichuan, Gansu, and Qinghai. There are 19 beds covering 4,000 square kilometers with an estimated reserve of 7 billion cubic meters of peat. The peat contains over 10% oil and has a heat value of 2 to 4 kilocalories per gram.

Petroleum.—China has 5.4 million square kilometers of oil- and gas-bearing sedimentary rock basins, accounting for more than one-half of the country's territory. Estimates of China's onshore oil reserves range from 1 billion to 5 billion tons. In 1984, crude oil output was close to 115 million tons. About one-half of the production was from Daqing, Heilongjiang. Exploration was being conducted to find new reserves at Daqing and its periphery from Nei Monggol down to the Liaohe Basin in Liaoning.

The most active exploration and development work being conducted was in the Bohai Basin, which has both onshore and offshore areas and includes Bohai, Dagang, Huabei, Liaohe, Shengli, and Zhongyuan Fields. During drilling in 1984, two high-yield wells were reported for Shengli, and one each for Liaohe and Zhongyuan.

Tarim Basin in Xinjiang is China's largest sedimentary rock basin. China was actively surveying Tarim. Surveys indicated more than 170 oil-bearing structures, 100 oil and gas prospects, and 2 medium-size oil-and-gas fields.

Seismic surveys were being conducted at Beishawo, Xinjiang, near the old Karamay Field in the Junggar Basin. Seismic surveys were also being conducted in the Erlian Basin, while exploration data was being collected for the northern section of the Ordos Basin, both in Nei Monggol. Oil finds were reported in the Jianghan Basin, which straddles Hunan and Hubei. To date, there has been little activity in southern China. However, oil exploration was being carried out in Guangdong, Hainan, and Shiwan Dashan in Guangxi.

China has 1.3 million square kilometers of offshore Continental Shelf at a water depth of less than 200 meters. In offshore exploration, seismic test lines with a total length of 108,000 kilometers were completed, and 300 reservoir structures were uncovered; 200 of these were considered promising reservoirs. Of 70 exploratory wells drilled, about one-half showed oil or gas.

Sino-Japanese exploration has been conducted since 1980 offshore Bohai. Although this area has the highest success rate for oil finds, drilling and appraisal was expected to continue only until 1988. Detailed exploration was being concentrated in a 600- to 700-square-kilometer area in the cooperative zone. Trial production in this area was

planned for 1988.

Sino-French exploration began in 1981 in the Beibu Gulf. In this zone, oil was found in a fault reservoir, and full appraisal of the oil-bearing structure has not yet been completed. Beginning in mid-1986, drilling was to begin on six wells for a trial production period. Much of the data to be collected will be for an analysis of reservoir behavior in this complicated structure.

Gas finds were reported in the Dongpu Depression in Henan; the Shaanxi-Gansu-Ningxia Basin; the North China Basin in Nei Monggol; the Songhua-Liaohe Basin in Heilongjiang; the Suqiao area in central Hebei, and in the Sichuan Basin. Gas reserves at Dongpu were estimated at more than 10 billion cubic meters. In the Shaanxi-Gansu-Ningxia Basin, drilling yielded a well with a daily output of 258,000 cubic meters of gas. A well in the Lishu Depression of the southern part of the Songhua-Liaohe Basin yielded 60,000 cubic meters of gas per day.

Second-round bidding for offshore oil exploration and development was opened on November 22, 1984. The new tracts include 100,000 square kilometers in the eastern part of Yingge Basin of the Nan Hai, 50,000 square kilometers in Zhujiang Basin, and 43,000 square kilometers in the south Huang Hai. Bids and proposals were to be presented before July 1, 1985, and licenses were expected to be awarded by late 1985.

Petrochemicals.—China's annual refinery capacity is about 85 million tons. A total of about 80 million tons of crude oil was refined in 1984. Output of diesel oil, gasoline, kerosene, and lubricants was about 37 million tons. In addition, China produces about 5.6 million tons of ammonia, 1.1 million tons of plastic resins, 677,000 tons of detergents, 650,000 tons of ethylene, 400,000 tons of synthetic fibers, and 167,000 tons of synthetic rubber. Refining operations in China are under the aegis of the China National Petrochemical Corp., a national enterprise established in July 1983.

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[1]Physical scientist, Division of International Minerals.

[2]Where necessary, values have been converted from Chinese renminbi (RMB) to U.S. dollars at the rate of RMB2.77 = US$1.00 for 1984.

[3]State Statistical Bureau. (A Roundup of China's Economy in 1984.) Jingji Ribao (Beijing), Dec. 19, 1984, pp. 1-2.

[4]Xu Yi. (On the Second Stage Reform in the Substitution of Tax Payment for Profit Delivery.) Renmin Ribao (Beijing), Sept. 10, 1984, p. 5.

[5]Renmin Ribao (Beijing). (Temporary Provisions Issued by the State Council on Tax Reduction and Exemption in Special Economic Zones and 14 Port Cities.) Nov. 18, 1984, p. 2.

[6]Beijing Review. (Official Spells Out Investment Laws.) Jan. 21, 1985, No. 3, pp. 16-19.

[7]Guangming Ribao (Beijing). (Survey of Fourteen Coastal Cities Open to Foreign Trade.) June 11, 1984, p. 2.

[8]Ji Chongwei. (Theory and Practice of China's Policy of Opening to the Outside World.) Jingji Yanjiu (Beijing), No. 11, Nov. 20, 1984, pp. 7-8.

[9]Zheng Tabin. (Problems in the Reform of China's Foreign Trade Structure.) Jingji Yanjiu (Beijing), No. 11, Nov. 20, 1984, pp. 27-33.

[10]Renmin Ribao (Beijing). (Highway Construction Progresses Quickly in China.) Jan. 8, 1985, p. 2.

[11]Zhang Yangming. (Problems Concerning the Distribution of Communications and Transportation Networks and the Division of Transportation Labor in China.) Jingji (Hunan), No. 3, Aug. 1984, pp. 221-225.

[12]Yan Yuwen. (Our Nation's Developing Ocean Shipping Fleet.) Chuanjian Zhishi (Beijing), No. 3, Mar. 8, 1984, pp. 2-3.

[13]Shi Guangfu. (Nature Preserves in China.) Daziran (Beijing), No. 4, Dec. 8, 1984, pp. 54-55.

[14]Wang Gangyi. (Finds of Untapped Reserves.) Zhongguo Ribao (Beijing), No. 4, Dec. 8, 1984, pp. 54-55.

[15]Sun Daguang. (Rapid Advances in Geological Work.) Guangming Ribao (Beijing), Aug. 22, 1984, p. 2.

[16]Zhongguo Dizhi (Beijing). (Geological Remote Sensing Develops Rapidly.) No. 10, Oct. 13, 1984, pp. 23-26.

[17]Kajita, Yukio. (The Structure of China's Nonferrous Metals Industry.) China Newsletter (Tokyo), No. 54, pp. 18-23.

[18]Gongren Ribao (Beijing). (China's Output of Nonferrous Metals Moves Up to the Sixth Place in the World.) July 27, 1984, p. 1.

[19]Zhongguo Ribao (Beijing). (Thousands of Peasants Prosper in Gold Rush.) Nov. 24, 1984, p. 1.

[20]Li Perlin. (A Probe into the Policy of Stepping Up the Exploitation of Mines.) Jingji Guanli (Beijing), No. 10, Oct. 5, 1984, pp. 4-6.

[21]Jingji Diaocha (Beijing). (Local and Medium Small-scale Iron and Steel Industry.) No. 2, 1984, pp. 15-21.

[22]Meng Renlum, and Shang Changzhi. (The Direction of Energy Conservation for the Iron and Steel Industry.) Neng Yuan (Beijing), No. 5, Oct. 25, 1984, pp. 1-2.

[23]Zhongguo Ribao (Beijing). (Wuhan Steel Mill Problem Tackled.) July 6, 1984, p. 3.

[24]China Pictorial (Beijing). (An Expedition to the Qaidam Basin.) Feb. 1984, p. 8.

[25]Hingji Ribao (Beijing). (China Ranks Second in the World in Rare-earth Annual Production Capacity.) Sept. 15, 1984, p. 1.

[26]Yunnan Ribao (Kunming). (Our Province's Six Great Nonferrous Metal Mines Accomplish Their Tasks in Readjusting Underground Production.) Mar. 5, 1984, p. 1.

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